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GAS ABSTRACTS

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1. GAS INDUSTRY

British Gas

REPORT OF THE GAS COUNCIL. *Gas J.*, (British) **276**, 243 October 28: 309-10, 333-40 (1953) November 4; *Gas Times*, (British) **77**, 176-178 (1953) October 30; *Gas World*, (British) **138**, 1091-1102, (1953) October 31.

The fourth annual report of the British Gas Council for the year ended March 31, 1953, is discussed, with outlines of the operations of each of the 12 area boards. Only the Scottish board reported a deficit, the aggregate showing a surplus of £ 2,272,631. The serious effect of increased cost of coal (£ 25 million) is emphasized, and the determined struggle against obsolescence is shown by the investment of about £ 30 million in depreciation, interest, taxes (before surplus). O. P. Brysch

NEW GASWORKS AT SWAN VILLAGE. *Gas J.* (British), **276**, 122-27 (1953) October 14; *Gas World*, **138**, 972-81 (1953) October 17; *Gas Times* (British), **77**, (1953) 93-4, 99-100 (1953) October 16; *Coke and Gas* (British), **15**, 341-52, October; (1953) 397-407 November.

Production capacity for the 300 square-mile area of the Birmingham gas grid has been increased by a new installation rated at 8.5 MMCFD coal gas and 3 MMCFD water gas. Detailed description is given of the new 64-unit carbonizing plant (continuous vertical retorts) and auxiliaries. which began operations October 6 on the 125-year-old gas works site at Swan Village, north of Birmingham.
D. M. Mason

Degree Day Revision

WEATHER BUREAU ADOPTS NEW DEGREE-DAY NORMALS. *Gas Heat*, **4**, 40-42, 44 (1953) November.

Degree-Day normals for 288 reporting Weather Bureau stations across the country have been revised, effective July 1, on a shorter and more recent base period. The old normals had been based on the average of 43 years from 1899 through 1941, and in many cases had been put together from incomplete information. The new degree-day normals are based on the 30-year experience from 1921 through 1950, and in most cases show a lower heating load than the old figures. The accompanying tables show the new normals by months for the principal stations. Authors' Abstract

Employee Training

Teasdale, H. THE DEVELOPMENT OF HUMAN POTENTIAL. *Gas Times* (British), **77**, 161-164, 167 (1953) October 30; *Gas World* (British), **138**, 1105-6, 1108 (1953) October 31.

A discussion of what is desirable in the training and education of employees. Granting that Great Britain's situation is quite different from our own, the observations made about the social and psychological aspects of training are of universal interest. This article is deliberately non-practical, but thought provoking and worthwhile. R. F. Bukacek

Fog Disaster

Scott, J. A. THE LONDON FOG DISASTER. *Gas J.* (British), **276**, 44-45 (1953) October 7.

The catastrophe of December 1952 is discussed. Data on air pollution and on registered deaths during this period are analyzed. Until further research specifies the agents responsible for such disasters and the means for their elimination, it is suggested that certain prevention measures be practiced. These would include the proper use of smokeless fuels in domestic grates, the discharge of industrial effluents from chimneys of adequate height, and the cessation of industrial activity during periods of hazardous weather conditions. C. E. Hummel

Gas Market Research

Conover, A. W. MARKET MANAGEMENT BY HUNCH OR FACT. *Am. Gas Assoc. Monthly* **35**, 4-6, 53 (1953) September.

The need for an adequate market research program to reduce the hunch in management to a minimum is discussed. At the Equitable Gas Co., (Pittsburgh), a 3-phase census of industrial, commercial and residential customers was

made to obtain current market data. The new data furnishes a great deal of information usable in predicting gas loads, and also types of gas loads. The data also furnishes information concerning inroads made by competitive fuels.
E. F. Searight

Industry Information

Grant, W. C. INDEPENDENT NATURAL GAS ASSOCIATION STARTS PUBLIC INFORMATION PROGRAM FOR INDUSTRY. *Gas Age*, 112, 78, 79, 117, 118 (1953) October 22.

This program will supply all segments of gas industry with information, advertising and publicity, stressing two initial themes: importance to consumer of encouraging discovery and production of natural gas to assure adequate, dependable supplies; and what goes into the job from well to burner-tip. Author's Abstract

New Patent Law

Calvert, R. THE NEW PATENT LAW. *Chem. Eng. News*, 31, 4186-4188 (1953) October 12.

A review of the new U. S. patent law which combines acceptable court interpretations and practices in a single logical law. H. R. Linden

Protection of Records

NFPA Fire Record Department. RECORD CONTAINER PERFORMANCE. *Nat. Fire Prot. Assoc. Quarterly*, 47, 159-170 (1953) October.

A report on 394 fires occurring from 1947 to 1952, involving 639 record containers, with 53 vaults also analyzed and reported. Factual evidence points out that containers are now available that will provide protection for records under all degrees of expected fire exposure, intensity and duration. This protection must be determined in a scientific manner. If the maximum exposure hazard is properly assessed and a container designed against that degree of hazard is provided, protection against the maximum degree of exposure to which records may be subjected can be assured. By selecting a container or door that has been tested and labeled by the Underwriters' Laboratories, Inc., or other nationally recognized fire testing laboratory, assurance of the desired degree of protection can be obtained. C. A. Simms

Regulation

Martindell, J. ROADBLOCKS TO SOUND UTILITY REGULATION. *Public Utilities Fortn.*, 52, 757-764 (1953) November 19.

The author points out that sound regulation is that which encourages investment in growth of utilities, and the principle roadblocks are, 1) strict adherence to the "original cost formula" without regard to changing conditions, particularly inflation, 2) artificial restraints arising out of accounting and tax policy, and 3) political aspects of regulation.
A. E. Neumann

2. APPLIANCES

Burners

Kuehne, O. C. GAS BURNER WITH MULTIPLE MIXER AND SINGLE COMBUSTION CHAMBER. U. S. 2,661,056 (1953) December 1.

Resek, M. (assigned to Perfection Stove Co.) GAS BURNER HEAD AND SECONDARY AIR BAFFLE. U. S. 2,661,057 (1953) December 1.

Controls and Ignition

Drow, D. F. (assigned to Minneapolis Honeywell Regulator Co.) FLOW CONTROL AND SHUTOFF VALVE FOR PILOT BURNERS. U. S. 2,657,006 (1953) October 27.

Mathews, R. B. (assigned to Milwaukee Gas Specialty Co.) BURNER CONTROL SYSTEM. U. S. 2,659,844 (1953) November 17.

Cookers

Ogden, W. H. COMBINED ELECTRIC AND GAS OPERATED RANGE OR STOVE. U. S. 2,658,987 (1953) November 10.

Space Heaters

Hughes, G. E. (assigned to Surface Combustion Corp.) UNIT HEATER WITH DRAFT HOOD. U. S. 2,660,159 (1953) November 24.

Hughes, G. E. and Saurborn, E.(assigned to Surface Combustion Corp.) BURNER MOUNTING FOR WARM AIR HEATERS. U. S. 2,658,569 (1953) November 10.

Jaye, R. C. and Hirtz, J. F. (assigned to Syncromatic Corp.) GAS FIRED FORCED AIR FLOW AIR HEATING FURNACE. U. S. 2,658,504 (1953) November 10.

Moran, W. O. GAS HEATER. U. S. 2,656,833 (1953) October 27.

Murphy, H. S. FORCED AIR FLOW AIR-HEATING FURNACE. U. S. 2,660,160 (1953) November 24.

Pearce, R. T. FORCED AIR CIRCULATING HEATER. U. S. 2,660,161 (1953) November 24.

Water Heater

Whitney, L. F., Whitney, W. E. and Comstock, D. F. (assigned to Comstock & Westcott, Inc.) HOT-WATER GENERATOR AND STORAGE SYSTEM. U. S. 2,660, 163 (1953) November 24.

3. COMBUSTION AND INDUSTRIAL FURNACES

Air Pollution

SMOKE ABATEMENT A NATIONAL OBLIGATION. *Fuel Economist* (British), 1, 40-42 (1953) September.

Presented are results of research work on smoke abatement, which would enable a definition to be made of industrial smoke density. A description is given of a pilot plant scrubber for the removal of sulfur oxides from flue gases by an ammonia process. D. J. Dennison

Combustion Behavior

Schuster, F. GASQUALITAET: BRENNVERHALTEN UND REINHEIT (GAS QUALITY: COMBUSTION BEHAVIOR AND PURITY. *Gas u. Wasserfach*, 94, 544-6, 547-51 (1953) October 1.

Combustion behavior of commercial fuel gases is reviewed in some detail. Methods of characterization of combustion behavior through composition are explained together with their present application to commercial appliances. Their development and improvement by research is outlined during the period since coal gas had to be supplemented by other commercial gases, and the "Krummhuebeler Richtlinien" (density; inerts; Wobbe number charts) and other German and foreign modifications are discussed. O. P. Brysch

Dust Removal

Leason, D. B. SOME ASPECTS OF THE APPLICATION OF CYCLONE SEPARATORS TO OPEN-CYCLE GAS TURBINES BURNING ASH-FORMING FUELS. *Brit. Coal Utilis. Assoc. Monthly*, 17, 309-319 (1953) August.

A study of the operating characteristics of cyclone separators shows that the reverse-flow cyclone offers the most practical method of cleaning gases in a gas turbine. A few tests of this affliction have been made with additional investigation required in the study of pressure drop and collecting efficiency at operating conditions. E. J. Pyrcioch

Heated Pool

A GAS-HEATED SWIMMING POOL. *Gas World* (British), 88, Suppl. 28-30 (1953) August 15.

The report relates to a pool owned by the Spalding Urban District Council. The capacity of the pool is 120,000 gal. and the purification plant is designed to filter quantity of water in 8 hr., which is equivalent to a rate of 15,000 gal./hr. Measured quantities of sulphate of alumina are added to the water before passing through a filter. The filter operation takes between 20 and 30 minutes, and water passing through the filter is drained to waste. A diagrammatic layout of the plant is also shown. J. G. Chalcraft

Heat Treatment

Everhart, J. L. SURFACE HARDENING OF STEELS AND IRONS. *Materials and Methods*, 38, 137-152 (1953) October.

This manual on the surface hardening of steels

and irons discusses selection factors, characteristics, and applications of the common processes. Carburizing, the most widely used method, introduces carbon into a solid iron-base alloy by heating above the transformation temperature range. Gas carburizing is advantageous in that the gas composition and flow rate can be adjusted to obtain desired carbon content and depth of case. Nitriding effects reaction of active nitrogen with certain alloying constituents to form nitrides in the steel. Wear resistance and retainment of hardness at higher temperatures is an advantage. In cyaniding and carbonitriding N_2 and C are absorbed simultaneously. Flow and induction hardening employ instantaneous heating of the surface leaving the core unchanged. All these methods are compared and illustrated with examples. A. J. Tulis

Pruett, S. C. AUTOMATIC GAS EQUIPMENT IS THE KEYNOTE FOR THIS MODERN HEAT TREATING PLANT. *Ind. Gas*, 32, 3-6 (1953) October.

The economy, ease of control, dependability, safety and cleanliness of the use of gas and automatic gas equipment, at the extensive heat treating facilities of Benedict-Miller, Inc. is discussed. These facilities concern martempering, austempering, annealing, hardening, carburizing, normalizing, building heating, water heating and plate burning. J. R. Boyd

4. CARBONIZATION AND GASIFICATION

Carbonization

Brown, W. T. PROCESS OF COKING A MIXTURE OF A CARBONACEOUS MATERIAL AND A HIGH BOILING BITUMINOUS PITCH. U. S. 2,656,309 (1953) October 20.

High quality lump coke is made from coke breeze or fines, by mixing the dry —¼-inch material with a high-melting (b.p. + 300° C.) coal tar pitch and heating to 1800°F. as a static charge in a bottom-heated chamber such as the Knowles or Hughes oven. Melting, flowing and wetting of the coke by the pitch occurs, and at higher temperature polymerization of the bitumen hydrocarbons produces a bonded mass. O. P. Brysch

Clark, J. W. APPARATUS FOR TREATING CARBONACEOUS MATERIAL. U. S. 2,655,470 (1953) October 13.

Solid carbonaceous materials are carbonized or heat-treated in batches with a hot gas stream, by charging in a series of vertically superimposed compartments, formed by perforated plates fixed to a central hollow shaft, the assembly being confined removably in a perforated cylindrical container. The charged container is lowered into hot retort. Gases and oils escape through top and bottom outlets respectively. O. P. Brysch

Coal Tar Research

McNeil, D. THE COAL TAR RESEARCH ASSOCIATION. *Chem. and Ind.* (British) No. 40, 1040-1043 (1953) October 3.

This industrial research association is sponsored by the British Coking Industry Association and the Association of Tar Distillers. A description of the laboratories, research program and projects presently under study is given. These projects are concerned with the most profitable utilization of coal tar. E. Mann

Dust Removal

Lesher, C. E. (assigned to Pittsburgh Consolidation Coal Company) METHOD OF DISCHARGING SOLIDS AND GASES FROM A FLUIDIZED BED. U. S. 2,654,699 (1953) October 6.

Dust is separated from gases and vapors at the temperature of the fluidized contacting zone, by completely immersing a cyclone-type separating vessel within this zone. Raw dusty gases are drawn down to this cyclone from the usual disengaging space above the bed, are cleaned by cyclone action and discharged from further contact, while the dust may be returned to the bed or discharged separately. O. P. Brysch

Fluidized Gasification

Gaucher, L. P. (assigned to The Texas Company) GENERATION OF HEATING GAS FROM SOLID FUELS. U. S. 2,657,124 (1953) October 27.

The patent provides a fluidized bed of carbonaceous solids wherein distillation occurs, su-

perimposed on a second chamber wherein the carbonaceous residue from the distillation zone is gasified by oxygen and steam mixtures.

C. G. von Fredersdorff

Gorin, E. (assigned to Pittsburgh Consolidation Coal Co.) GASIFICATION OF CARBONACEOUS SOLID FUELS. U. S. 2,654,-661 (1953) October 6.

Methane is produced continuously by hydrogenation of carbonaceous residues in a fluidized bed operating at preferably 20 to 50 atmospheres. The hydrogen required may be produced by steam-reforming of a portion of the product gases in a second fluidized bed containing calcium oxide.

C. G. von Fredersdorff

Gorin, E. (assigned to Pittsburgh Consolidation Coal Co.) GASIFICATION OF CARBONACEOUS SOLID FUELS. U. S. 2,654,-662 (1953) October 6.

Carbonaceous residues are hydrogenated continuously in a fluidized bed to produce methane-rich gases. Steam-reforming of a portion of the product gases in a second fluidized vessel containing barium oxide supplies the hydrogen required for the process.

C. G. von Fredersdorff

Gorin, E. (assigned to Pittsburgh Consolidation Coal Co.) GASIFICATION OF CARBONACEOUS SOLID FUELS. U. S. 2,654, 663 (1953) October 6.

Same as U. S. 2,654,661 except that strontium oxide serves as the CO_2-absorbing agent in the hydrogen generator.

C. G. von Fredersdorff

Mayland, B. J. (assigned to Phillips Petroleum Co.) METHOD FOR GASIFYING COAL. U. S. 2,657,501 (1953) November 3.

A pebble heater apparatus is described for gasifying pulverized coals of low ash-fusion temperature.

E. J. Pyrcioch

Reichl, E. H. and Safford, R. V. (assigned to Pittsburgh Consolidation Coal Co.) GASIFICATION OF CARBONACEOUS SOLIDS. U. S. 2,654,664 (1953) October 6.

A method is claimed of gasifying pulverized carbonaceous fuels by steam in a fluidized bed, with heat supplied by continuously burning a portion of the pulverized fuel in a separate recycle stream.

C. G. von Fredersdorff

Gypsum Sulfate

Robinson, S. P. (assigned to Phillips Petroleum Co.) AMMONIUM SULFATE AND CALCIUM OXIDE MANUFACTURE. U. S. 2,656,247 (1953) October 20.

Gypsum slurry, with a Ca salt dispersal agent, when reacted as in the Merseberg ammonium sulfate process with excess ammonium carbonate in a 3-stage treatment at pH 8.8 to 9.2, gives a complete reaction to yield large crystals of calcium carbonates. These are filtered, pulped and flotation-treated to remove silica and the float is calcined at 1800° to 2400°F. with carbon to remove phosphate, fluoride and finally to yield pure byproduct lime.

O. P. Brysch

Lignite Extract

ALL-DOMESTIC RAW MATERIALS STABILIZE SUPPLY, PRICE FOR MONTAN WAX. *Chem. Processing* 16, 20-21 (1953) November.

Properties, uses and extraction of montan wax are briefly noted. Ione, California, lignite (200-mesh) yields about 280 lb. crude wax per ton with petroleum solvent, which is then filtered, steam-distilled, and the solvent recycled.

O. P. Brysch

Low-Ash Carbon

Phillips, N. W., Hollingshead, E. A. and Mutchmor, J. S. (assigned to Aluminum Laboratories Ltd.) METHOD OF PURIFYING CARBONACEOUS MATERIAL. U. S. 2,657,118 (1953) October 27.

To produce a low-ash carbon for electrode manufacture, coke or anthracite coal (—⅜-inch size) is passed downward through a refractory-lined shaft furnace, and treated with a countercurrent stream of chlorine, while the charge is heated (electrically) to 1400°C. or above. Volatilization of ash metallics, especially iron, silicon and titanium in the form of chlorides is quite complete, at an economic rate.

O. P. Brysch

Oil Gas

Sholar, J. SOUTH CAROLINA ELECTRIC & GAS REVIEWS THREE YEARS OF HIGH-BTU OIL GAS. *Am. Gas J.*, 179, 20, 21, 38 (1953) October 15.

Operating experience and economic factors are reviewed on the production of one billion cubic feet of high-Btu oil gas from 6-7% Conradson-carbon residual oils. Two twin-generator sets with back-blast were used in producing this 1000 Btu/CSF base-load gas at a total heat-and-make-oil requirement of 13.4 gal/MCF. Tar production was 2.6 gal/MCF and light oil recovery 0.8 gal/MCF. H. R. Linden

Oven Heating

Cottrell, A. F. HEATING UP NEW VERTICALS. *Gas J.*, (British) 276, 256-58, 63, 64 (1953) October 28.

A method of firing and heating up new vertical coke ovens to prevent damage of brickwork. Recommended procedures and limits of temperature rises are presented for the drying out, heating up and lighting up phases of the operation to insure long life and most efficient operation. G. V. Vosseller

Reformed Gas

Mayland, B. J. (assigned to Phillips Petroleum Co.) PROCESS AND APPARATUS FOR THE MANUFACTURE OF SYNTHESIS GAS. U. S. 2,655,442 (1953) October 13.

This invention relates to a process for manufacturing carbon monoxide and hydrogen synthesis gas. In one of its more specific aspects, it relates to an improved process and apparatus for making synthesis gas by the partial oxidation and catalytic reforming of natural gas. Author's Abstract

Suspension Gasifier

Moore, F. H. (assigned to The Texas Company) SYNTHESIS GAS GENERATION. U. S. 2,655,443 (1953) October 13.

The production of synthesis gas from powdered coal is carried out in a tangentially-fired annular space in an insulated elongated reactor. Coal-steam mixtures and oxygen react in the upper section of the gasifier while product gases are withdrawn via a central tube extending a short distance into the gasifier.

C. G. von Fredersdorff

Yellott, J. I. (assigned to Institute of Gas Technology, Chicago, Ill.) MANUFACTURE OF CALORIFIC GAS. U. S. 2,656,264 (1953) October 20.

The generation of low heating value gases from coal is accomplished in a combination apparatus comprising a continuous explosion pulverizer using compressed gases or steam to reduce the coal particle-size, followed by high temperature gasification of the pulverized coal in suspension with oxygen and steam in a cyclone-type combustor.

C. G. von Fredersdorff

5. NATURAL GAS AND NATURAL GAS CONDENSATES

Ammonia Synthesis

Foster, A. L. AMMONIA FROM NATURAL OR REFINERY GASES AND AIR. *Petroleum Eng.*, 25, C3-C5 (1953) September.

A flow sheet and description are presented of a typical commercial process by which hydrogen is produced from natural gas and combined with nitrogen from the air to produce ammonia and nitrate fertilizer.

D. M. Mason

Kuenzly, F. D. THE ROLE OF NATURAL GAS IN PETROCHEMICAL MANUFACTURE. *Oil Gas J.*, 52, 112, 114, 116 (1953) October 26.

The manufacture of ammonia from natural gas is discussed. Production and purification methods and costs for synthesis gas made from natural gas and coke are compared.

J. M. Reid

Appliance Regulators

Bunnell, F. H. APPLIANCE TYPE REGULATORS. *Amer. Gas Assoc. Monthly*, 35, 13, 14, 53 (1953) October.

Discussion of the method by which Consumers Power Company, Jackson, Michigan obtained

added system capacity in distributing natural gas. Accomplished by installing an ordinary small, single valve appliance regulator (inlet pressure up to 15" H_2O, outlet from 4 to 4½" H_2O) between meter and all customer appliance except space-heating units which are or can be so equipped. Street main can fluctuate 4 to 10" H_2O as the load requires, resulting in a system capacity increase. Method has the same advantages as replacing mains or converting to medium-pressure system, with additional benefits. J. R. Boyd

Automatic Purification

Nicol, D. L. AUTOMATIC CONTROLS EFFECT REAL ECONOMY. *Oil Gas J.*, 52, 295, 96, 98, 300, 02 (1953) September 21.

An unattended gas-purification plant near Wink, Tex., is enabling Southern Union Gas Co. to recover sour gas for distribution in six West Texas towns served by the company, while holding purification costs to a minimum. Except for maintenance work done by regular pipe-line crews, the only labor required in operating the plant is 1 hr. each day by one man to change charts and take readings. Instrumentation including safety controls and shutdown system are described. D. M. Mason

Carbon Black

Ammann, H. L. APPARATUS FOR PRODUCING CARBON BLACK. U. S. 2,658,821 (1953) November 10.

The invention claims a design of a chamber reactor for the production of very fine carbon black by the explosion process. The design and operation are quite similar to that of an internal combustion engine, including spark ignition of the hydrocarbon-air mixture and scavenging with a gas to remove all carbon from the chamber and to cool the chamber to the desired temperature.

H. C. Owen

Heller, G. L. (assigned to Columbian Carbon Company) CARBON BLACK. U. S. 2,656,254 (1953) October 20.

A process is described for the production of carbon black in a furnace of similar design to a cyclone separator. The process involves counter-current flow between fuel gas-air mixture and decomposing hydrocarbon make-gas. A high velocity stream of hot-blast flame gases spirals upward through the cylindrical portion of the chamber toward the apex of the conical section where the hydrocarbon make-gas is introduced. This mixture then returns through the chamber of the furnace at the opposite end. M. Quinn

Cavern Storage

Raymond, L. C. PROFIT POSSIBILITIES IN CAVERN STORAGE OF NATURAL GAS NEAR MAJOR MARKETS. *Gas Age*, 112, 21-24, 64 (1953) October 8.

Due to the lack of additional depleted gas fields for development as reservoirs and the disadvantageous location with respect to consumer markets of most natural storage areas, the continuing increase in requirements for natural gas makes cavern storage look promising to the industry. The author has discussed comparative advantages and disadvantages of the various types of gas storage with respect to filling the needs of both transmission and distribution companies. In addition a comparative cost analysis of depleted gas-field and mixed cavern-type storage is presented, showing the capital investment and the operating costs of each. In the light of the data presented here, cavern storage is very favorable costwise.

J. M. Reid

Hydrocarbon Extraction

Katz, D. L., Schatz, R. H. and Williams, B. PROBLEMS IN HYDROCARBON EXTRACTION—2. *Oil Gas J.*, 52, 108, 110, 111 (1953) November 2.

This second part deals with methods of obtaining thermal properties, density, viscosity and surface tension. 50 references are cited.

D. C. Gami

Lents, M. R. and Hudson, W. S. FIVE-FIELD NATURAL-GASOLINE PLANT. *Oil Gas J.*, 52, 104-109, 115, 117, 120, 123 (1953) October 19.

One of the larger producers of casing-head-gas products in West Texas is the new East Veal-

moor plant, for processing gas produced from the Pennsylvania reef. The plant utilizes many unusual features including: 160 miles of field and transfer lines, underground washed-out cavity storage for LP-gas, and a gasoline plant processing casing-head gas which contains no reabsorbers or recompressors but which recovers up to 94% of the propane and essentially all of the heavier components. The operation and layout of the plant is described.

B. E. Eakin

Vagtborg, H., Jr. EQUILIBRIUM VAPORIZATION RATIOS FOR A RESERVOIR FLUID CONTAINING A HIGH CONCENTRATION OF HYDROGEN SULPHIDE. Am. Inst. Min. and Met. Engrs., Paper No. 327-G, Dallas (1953) October 19-21.

Equilibrium vaporization ratios were obtained experimentally for light hydrocarbons, nitrogen, carbon dioxide, and hydrogen sulfide in a reservoir fluid containing 35 mole per cent hydrogen sulfide. The data cover the range from 700 to 2500 psia at 154°F., and are presented in tabular and graphical form. It is shown that use of published correlations on physical-properties of reservoir fluids can lead to gross errors when applied to high hydrogen sulfide content systems.

B. E. Eakin

H_2S Hazards

Austin, G. HOW YOU CAN COMBAT HYDROGEN SULFIDE HAZARDS... *World Oil*, 137, 190, 192 (1953) November.

The toxic effects of hydrogen sulfide and treatment for cases of poisoning are described. Precautions to be observed in hazardous areas are indicated.

C. E. Hummel

LP-Gas Bus Fuel

L.P.G. FUELS BUSES. *Oil Gas J.*, 52, 71 (1953) November 9.

Reports from three city transit companies, Chicago, Wichita and San Antonio, to SAS indicate satisfaction with LP-gas fueled buses. All three report definite savings in oil, LP-gas consumption and engine life (before major overhauls are needed) over gasoline-fueled buses which result in lower operating costs. These savings were due to the favorable price advantages which the individual companies were able to obtain.

H. A. Dirksen

LP-Gas Supply

Kroch, E. EVOLUTION DE LA PRODUCTION ET DE LA DISTRIBUTION DES GAS DE PETROLE LIQUEFIES EN BENELUX. (EVOLUTION OF THE PRODUCTION AND DISTRIBUTION OF LIQUEFIED PETROLEUM GASES IN BENELUX). *Rev. Gen. Gaz*, (Belgium) 75, 111-124 (1953) July-August.

This is a chronological exposition of the liquefied petroleum gas industry in Benelux, from the origin to the present status in the global market. Many references are made on the part played by the U.S.A., whether concerning the leading contribution to the commercial evolution of this gas, or the help received after the war to get Europe started again. For a gas man this is a valuable source of information on supplies, production technology, consumption, and statistics.

S. Sensi

Turner, C. C. BASIC FACTS FOR BULK PLANT EMPLOYEES. *LP-Gas*, 13, 44-50 (1953) November.

Part 3 of this series deals with gauging and filling LP-gas storage containers. Reference is made to NFPA pamphlet 58 which gives maximum filling densities for all LP-gas. Proper techniques for temperature readings are also discussed.

W. G. Bair

Network Analyzer

COLUMBIA GAS SYSTEM INSTALS ANALYZER TO SOLVE DISTRIBUTION PROBLEMS. *Gas Age*, 112, 28-29 (1953) October 8.

A new $62,000 electronic "brain" known as the McIlroy Pipeline-Network Analyzer has been installed by Columbia Gas System in Columbus, Ohio. The machine will solve in only a few hours pipeline network problems that previously were not even attempted. It helps to estimate pipe sizes by using electricity flowing through wires to simulate gas flowing through pipelines and thus also provides a pressure survey. The "crew" will consist of two engineers, one who reads the schedule, or data about the network to be analyzed, while the other plugs in the cords and "fluistors" which will simulate that network electrically. Demountable scales which fit over the dials translate all the an-

swers directly from electric units into the gas man's language of inches of water and cubic feet per hour. J. G. Chalcraft

New Supply

Grant, W. C. HOW UNITED GAS SYSTEM HAS GROWN TO TRILLION-A-YEAR MAGNITUDE. *Gas Age*, 112, 57-65, 118, 120, 122, 124 (1953) October 22.

Detailed description is given of development required to boost the United Gas System's total energy potential to four times that of the Hoover, Coulee and Bonneville dams. Also included is a description of how United pioneered the laying of large diameter pipe under the water of the Gulf of Mexico. R. A. Bambenek

Sterne, W. P. HUGE GAS PROGRAM NEARING END. *Oil Gas J.*, 52, 58-60 (1953) November 2.

Southern Natural is completing the last segment of a tough 450-mile expansion project in the southern Louisiana swamps. Completion of the final segment of the Louisiana gas supply system will mark the end of the company's 3-year expansion project, involving laying 1,254 miles of loops and extension, and the addition of 22,250 hp in compressor capacity, to boost the throughput to more than a billion cubic feet of gas/day. B. E. Eakin

Pipeline Flow

Schneider, F. N., White, P. D. and Huntington, R. L. SOME ASPECTS OF SIMULTANEOUS HORIZONTAL TWO-PHASE FLUID FLOW THROUGH PIPELINES; Baker, O. DESIGN OF PIPELINES FOR THE SIMULTANEOUS FLOW OF OIL AND GAS. Am. Inst. Min. and Met. Engrs. Paper No. 322-G and 323-G, Dallas (1953) October 19-21.

The data presented in these two reports, when plotted on a single chart, show a very excellent agreement. The pressure drops experimentally determined are much greater than the sum of the calculated drops due to the flow of each fluid thru a pipe. Correlations are presented which allow the two-phase pressure drop to be predicted if the individual flow rates, physical properties, and pipe diameters are known. B. E. Eakin

Reservoir Engineering

Croes, G. A. and Schwarz, N. DIMENSIONALLY SCALED EXPERIMENTS AND THE THEORIES ON THE WATER-DRIVE PROCESS. Am. Inst. Min. and Met. Engrs. Paper No. 332-G, Dallas (1953) October 19-21.

The rsults of an extension of the model displacement experiments to measure the efficiency of the water-drive process, started by Engelberts and Klinkenberg, are presented in the form of a diagram from which oil recovery and water/oil ratio can be determined as a function of total production for viscosity ratios in the range from 1 to 500. The experimental data can be described by the Dietz theory and can be correlated with that of Buckley and Leverett. B. E. Eakin

Dyes, A. B., Caudle, B. H. and Erickson, R. A. OIL PRODUCTION AFTER BREAKTHROUGH—AS INFLUENCED BY MOBILITY RATIO. Am. Inst. Min. and Met. Engrs. Paper No. 309-G, Dallas (1953) October 19-21.

The paper presents the experimental results and conclusions of a laboratory study of the effect of mobility ratio on oil production after breakthrough. The experimental procedure is outlined and the applications of the laboratory data to gas injection operations is discussed. B. E. Eakin

Hassan, M. E., Nielsen, R. F., Calhoun, J. C., Jr. EFFECT OF PRESSURE AND TEMPERATURE ON OIL-WATER INTERFACIAL TENSIONS FOR A SERIES OF HYDROCARBONS. Am. Inst. Min. and Met. Engrs. Paper No. 298-G, Dallas (1953) October 19-21.

The interfacial tensions of benzene, propane, n-butane, n-pentane, n-hexane, n-octane, and iso-octane against water were measured and temperatures from 26° to 82°C. and at pressure ranging from 1 to 204 atmospheres. The results are presented in equation and graphical form. B. E. Eakin

Levine, J. S. DISPLACEMENT EXPERIMENTS IN A CONSOLIDATED POROUS SYSTEM. Am. Inst. Min. and Met. Engrs. Paper No. 308-G, Dallas (1953) October 19-21.

The results of flow potential distribution experiments on a large alundum core are present-

ed for each liquid phase thru oil-wet and water-wet capillary barriers. Relative permeability points have been calculated and average curves drawn for oil displacing water and water displacing oil. A comparison is shown between actual recoveries and the theoretical recoveries calculated by the generalized Buckley-Leverett fractional-flow equation. B. E. Eakin

Templeton, C. C. A STUDY OF DISPLACEMENTS IN MICROSCOPIC CAPILLARIES. Am. Inst. Min. and Met. Engrs. Paper No. 307-G, Dallas (1953) October 19-21.

Techniques have been devised or improved for the observation of air-liquid and liquid-liquid displacement in uniform Pyrex capillaries with diameters as small as four microns. Qualitative descriptions of the behavior of moving interfaces are presented. B. E. Eakin

West, W. J. and Garvin, W. W. SOLUTION OF THE EQUATIONS OF UNSTEADY-STATE TWO-PHASE FLOW IN OIL RESERVOIRS. Am. Inst. Min. and Met. Engrs. Paper No. 340-G, Dallas (1953) October 19-21.

This paper describes a digital method of solving the equations of unsteady-state two-phase flow thru porous media and discusses some of the results which have been obtained to date. An IBM type-701 electronic data processing machine was utilized to perform the computations. B. E. Eakin

Underground Storage

Riegle, J., Jr. GAS STORAGE IN THE PLAYA DEL REY OIL FIELD. *J. Petroleum Techn.*, 5, 259-264 (1953) October.

The problems encountered during the operation of this underground storage and their solution are discussed. The problems are 1) the removal and retardation of emulsions, 2) the upstructure movement of fluid during withdrawal periods which formed fluid blocks and 3) reservoir shrinkage resulting from encroachment of edge water. Increase in withdrawal rate from original design capacity of 4,000 MCF per hour to the current 10,000 MCF per hour is obtained by operating the injection and withdrawal operations using different groups of wells. D. C. Gami

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

African Oil-from-Coal

POWER FOR SOUTH AFRICAN SYNTHETIC FUEL PROJECT. *Combustion*, 25, 42-44 (1953) October.

A coordinated project for producing synthetic petroleum products from coal is under construction. The plant will process 5000 tons of local coal/day to produce about 5400 bbl/day of oil and allied products. This represents about 20% of current South African consumption. The plant site is removed from populated areas and must produce all necessary steam and electricity. The pooled resources of several European and U. S. companies have been used to plan and equip the plant. W. B. Bair

Cracking

Brown, J. W. and Jahnig, C. E. (assigned to Standard Oil Development Co.) RESIDUUM COKING AND CRACKING. U. S. 2,655,464; 2,655,465 (1953) October 13.

This invention relates to a method for coking and cracking heavy residual stocks. It relates particularly to a method wherein ash and coke forming constituents of a heavy residuum feed are first removed from the feed by being deposited on particles of fluidized inert solids, preferably coke, under conditions conducive to a minimum conversion of the feed to lighter hydrocarbons, while overall conversion of the feed is primarily accomplished thereafter in a catalytic manner. Extract

Moorman, J. W. SOME FACTORS IN F.C.C. OPERATION. *Oil Gas J.*, 52, 116, 18, 21, 22 (1953) November 9.

This is the second of a series of articles on F.C.C. operation. The F.C.C. system is divided into 1) fluid bed, 2) heat balance, 3) pressure balance, 4) catalyst recovery. Each item is briefly discussed and schematic flow sheets are presented for 3 basic designs. Detailed discussion of these 4 divisions of the F.C.C. system is promised in later articles. W. G. Bair

Desulfurization

Burns, H. J. and Corcuera, C. L. MEXICAN

GASOLINE DESULFURIZED. *Petroleum Eng.*, 25, C-17, 18 (1953) October.

Petroleos Mexicanos finds it convenient and profitable to desulfurize straight run gasoline and part of the chemically cracked gasoline in three of their largest refineries by use of the cycloversion process. D. M. Mason

Hoffman, A. E. (assigned to Universal Oil Products Co.) DESULFURIZATION OF HYDROCARBONS. U. S. 2,655,463, (1953) October 13.

Desulfurization of petroleum fractions by treatment with hydrogen fluoride in liquid phase is improved by use of a solution of hydrogen fluoride in a chloro-hydrocarbon solvent.

D. M. Mason

Mason, R. B. (assigned to Standard Oil Development Co.) DESULFURIZATION OF HEAVY PETROLEUM OILS. U. S. 2,657,-175 (1953) October 27.

A hydro-desulfurization process is described in which a boron halide, particularly boron trifluoride, is used as catalyst for the desulfurization of reduced crude or residua. The boron trifluoride is prepared as a non-volatile complex with alcohol, ether, or water, and is dispersed or dissolved in the hydrocarbon, which is then treated with hydrogen at pressures from about 500 to 5000 psig and at temperatures from 300-900°F. Though particularly useful when applied to heavy feed stocks, the process can also be applied to other materials, such as gas oils, cycle oils, and heating oils. D. M. Mason

Porter, F. W., and Haresnape, J. N. (assigned to Anglo-Iranian Oil Company Ltd.) CATALYTIC DESULFURIZATION OF PETROLEUM HYDROCARBONS. U. S. 2,656,302 (1953) October 20.

In the catalytic hydrodesulfurization of petroleum hydrocarbons with cobalt-molybdenum oxide catalyst, increased dehydrogenation and desulfurization during the early hours on stream is obtained if the catalyst is preheated with hydrogen sulfide. D. M. Mason

Fischer-Tropsch Reaction

Kummer, J. T. and Emmett, P. H. FISCHER-TROPSCH SYNTHESIS MECHANISM STUDIES. THE ADDITION OF RADIOACTIVE ALCOHOLS TO THE SYNTHESIS GAS. *J. Am. Chem. Soc.*, 75, 5177-5183 (1953) November 5.

When one of the radioactive primary alcohols, such as ethanol, n-propanol or isobutyl alcohol, is added to the extent of about 1.5 volume per cent to a 1:1 hydrogen:carbon monoxide synthesis gas and passed over an iron catalyst at 235°, the results are interpreted as indicating that complexes resembling adsorbed alcohols are formed from carbon monoxide and hydrogen during synthesis and act as intermediates in the building up of higher hydrocarbons over iron catalysts. Authors' Abstract

Oil Imports

Ralph, H. D. WHAT TO DO ABOUT IMPORTS? *Oil Gas J.*, 52, 64-66 (1953) November 2.

Imports are increasing faster than the rate of domestic consumption with the result that domestic production is being curtailed, inventories are rising, and prices threaten to fall. The I.P.A.A. members at their fall meeting in Fort Worth adopted a three point resolution in an effort to curb imports. In effect, they would ask importing companies to hold their imports to 10 per cent of domestic demand; if this fails, to ask President Eisenhower to get imports reduced, by persuasion or otherwise; and, as a last resort ask Congress for a law if the other two do not work. Not all independents were favorably inclined to the resolution, but all did agree that: there is no simple solution to the imports problem; and, that independent producers are so independent in their thinking that it won't be simple to get them to agree on any course of action. B. E. Eakin

Propane Fractionator

Brien, E. B. PROPANE FRACTIONATOR ON STREAM AT WELLSVILLE, NEW YORK. *Petroleum Eng.*, 25, C12-C16 (1953) October.

A plant to produce deresined bright stock of good color and carbon content for use in premium motor oils, and various grade of resins, by propane fractionation is described. It has a minimum capacity of treating 700 bbl per day of original stock. D. C. Gami

Shale Distillation

Pettyjohn, E. S. (assigned to Institute of Gas Technology, Chicago) DISTILLATION OF OIL-SHALE. U. S. 2,656,308 (1953) October 20.

This patent claims a process for destructive distillation of oil shale which eliminates difficulties due to sticking and adhesion of the shale particles in a gas stream which is passed through a convergent nozzle, then tangentially into a vortex chamber. Rapid acceleration to critical velocity at the nozzle shatters the granules. Devolatilization, and further disintegration occurs in the vortex chamber into which hot combustion gases are passed. Oil vapors and shale granules are separated, and residual carbon is burned off in a fluidized system, providing combustion gases for the vortex chamber.

E. B. Shultz

Synthesis Shutdown

SYNTHESIS SWITCH. *Oil Gas J.*, 52, 66 (1953) November 9; *Gas* 29, 126 (1953) December.

It appeared certain at the week-end that all owners of the huge Carthage Hydrocol, Inc., gas-synthesis plant at Brownsville, Texas, will write off their investment and turn the plant over to the Reconstruction Finance Corp.

Extract

7. ANALYTICAL METHODS AND TESTS

Air Contaminants

Cooper, R. L. and Lindsey, A. J. ATMOSPHERIC POLLUTION BY POLYCYCLIC HYDROCARBONS. *Chem. and Ind.* (British) 44, 1177-1178 (1953) October 31.

Small amounts of anthracene, pyrene, benzpyrene and other polycyclic hydrocarbons were found in atmospheric soot and in freshly fallen snow.

C. E. Hummel

Littman, F. E. and Benoliel, R. W. CONTINUOUS OXIDANT RECORDER. *Anal. Chem.*, 25, 1480-1483 (1953) October.

This instrument consists essentially of a continuous air-liquid contacting device and a recording colorimeter. The analysis is based on the liberation of iodine from a buffered, neutral potassium iodide solution by the oxidant. The light transmittance of the resulting yellow solution is measured by a double-cell colorimeter and continuously recorded on a strip chart. The contacting solution is regenerated by passing through a bed of activated carbon. Excellent correlation was established between the oxidant concentration and smog, as manifested by reduced visibility, eye irritation, and crop damage.

Author's Abstract

McCabe, L. C. ATMOSPHERIC POLLUTION. *Ind. Eng. Chem.*, 45, 109A, 110A (1953) October.

A summary is presented of the analytical methods and equipment available for determining the most common atmospheric pollutants with a brief discussion of the relationship between air pollutants and industrial zoning.

E. J. Pyrcioch

Applied Spectroscopy

Peterson, M. J. and Jaffe, H. W. VISUAL-ARC SPECTROSCOPIC ANALYSIS. U. S. Bureau of Mines Bull. 524 (1953.)

Three practical applications of the spectroscope (determinative mineralogy, boiler scale, detection by molecular spectrum, and related fields) as an aid to and not an end to regular qualitative and quantitative analysis. The simplicity of the set up of equipment and procedure of analysis are emphasized. Complete tables of data for the procedures are listed. Various sources for equipment and cost ($1000 to $1200 complete) are suggested.

R. R. Amrine

CO_2 Determination

Parkhouse, D. THE DETERMINATION OF FREE AND COMBINED CARBON DIOXIDE IN CONDENSATES & BOILER FEED WATERS, AND STANDARDIZATION OF THE METHOD AGAINST KNOWN AMOUNTS OF CARBON DIOXIDE. *Chem. and Ind.* (British), 45, 1197-99 (1953) November 7.

Carbon dioxide-free air is passed through 5

liters of the sample until the water is free of dissolved CO_2. The CO_2 is simultaneously absorbed from the circulated air by passing through an absorber containing NaOH. The contents of the absorber are titrated with HCl. The method can be used to determine CO_2 concentrations below 10 ppm with an accuracy of 0.1 ppm. C. E. Hummel

Continuous Sampling

Thomas, B. W. and Martin, R. L. TWO SUCCESSFUL ANALYZER SAMPLERS. *Petroleum Processing*, 8, 1511-13 (1953) October.

Methods of delivering representative samples to continuous process stream analyzers are discussed. The problem of delivering a vapor-phase sample representative of the liquid-phase composition of a wide-boiling liquefied gas stream is included. D. M. Mason

Dust in Gas

Holton, W. C. and Schulz, E. J. SOME NOTES ON DUST-SAMPLING EQUIPMENT AND TECHNIQUE. *Amer. Soc. Mech. Eng. Trans.*, 75, 1327-1331 (1953) October.

Equipment and methods for dust-sampling of power-plant flue gases to determine the concentration of dust in the gas based on the ASME Power Test Code for Dust-Separating Apparatus are presented. The dust-sampling assembly consists essentially of a sampling nozzle, pitot tube, thermocouple, collectors, venturi, ejectors, and manometers. A construction drawing of the component parts is included.

E. J. Pyrcioch

Moisture in Coal

Hartmann, H. F. and Bachelard, H. S. A SPEEDY METHOD FOR THE DETERMINATION OF MOISTURE IN COAL. *Nat. Gas Bull.* (Australia), 17, 21-23 (1953) July-August.

The Dolch method for determination of moisture in coal, consisting of extracting the moisture by boiling the coal with alcohol, filtering, and determining the critical solution temperature of a mixture of equal parts of the filtrate and kerosene, was compared with the Dean and Starks method and the oven drying method. The precision of the Dolch method was found to be very good, with results averaging 0.04% higher than the Dean-Stark method.

D. M. Mason

Moisture Determination

Stuckey, R. E. THE DETERMINATION OF MOISTURE BY THE KARL FISCHER METHOD. *Laboratory Practice*, (British) 2, 542-548 (1953) October.

Use of the Karl Fischer method, including visual, potentiometric, and dead stop endpoint methods, modifications with interfering materials etc., is reviewed. D. M. Mason

Oxygen Method

Jones, W. H. DIRECT DETERMINATION OF OXYGEN IN ORGANIC COMPOUNDS. *Anal. Chem.*, 25, 1449-1452 (1953) October.

Cooperative work of a number of laboratories has shown that in general the total oxygen content of organic materials in the low range of 0.01 to 1.0% can be determined with reasonable accuracy by four different modifications of the Unterzaucher method. In the original Unterzaucher method the effect of pyrolytic hydrogen on the iodine pentoxide is a source of considerable error in the low oxygen range. In each of the four modifications, the effect of the pyrolytic hydrogen has been obviated in a different manner. Comparable precision and accuracy were obtained by methods utilizing titrimetric, gravimetric, and manometric techniques. Author's Abstract

Pepkowitz, L. P. and Shirley, E. L. QUANTITATIVE DETERMINATION OF OXYGEN IN GASES. *Anal. Chem.*, 25, 1718-20 (1953) November.

In this method for determining oxygen concentrations below 100 p.p.m., a precision better than $\pm$ 1 p.p.m., and a zero blank for the method are claimed. C. E. Hummel

Shale Oil Yield

Stanfield, K. E. ESTIMATING OIL YIELD OF LEAN OIL SHALE. *Anal. Chem.*, 25, 1552-53 (1953) October.

A simple rapid method is given, suitable for lean oil shales yielding up to 3 gallons of oil

per ton. A 3-gram sample is heated for 5 minutes at 600°C. The whole procedure requires only 1/12 to 1/18 the time needed for assay by the modified Fischer retort method. E. B. Shultz

Sulfur Determination

Fischer, R. B. and Rhinehammer, T. B. RAPID PRECIPITATION OF BARIUM SULFATE. *Anal. Chem.*, 25, 1544-1548 (1953) October.

A rapid gravimetric determination of sulfate as barium sulfate was developed and tested. The influence of various conditions on the morphology and size of particles of precipitated barium sulfate was studied using the light microscope and electron microscope techniques. Conditions investigated include sulfate and barium ion concentration, amount of barium ion in excess, pH, temperature and presence of foreign ions. D. J. Dennison

8. GENERAL AND PHYSICAL CHEMISTRY

Equilibria

Lenoir, J. M. and White, G. A. VAPOR-LIQUID EQUILIBRIUM RATIOS. PART I. THE GENERAL METHOD APPLIED TO BINARY SYSTEMS. PART II. TERNARY AND MULTICOMPONENT SYSTEMS. *Petroleum Refiner*, 32, 121-123 (1953) October.

In Part I, author's present a direct method of predicting equilibrium ratios for components in binary systems. The method depends upon the principle of convergence pressure developed by Hanson and Brown. Knowing the convergence pressure of the mixture and at the given temperature, the equilibrium ratio for a component at 10 psia, the equilibrium ratio at any other pressure can be directly read from the charts given in the paper. A 47-item bibliography is given. D. C. Gami

CO_2 Absorption

Bedekar, S. G. ABSORPTION OF CARBON DIOXIDE IN AGITATED SODIUM CARBONATE-BICARBONATE SOLUTIONS. *J. Appl. Chem.*, (British), 3, 524-527 (1953) November.

Coefficients of absorption of carbon dioxide in solutions containing sodium carbonate and bicarbonate have been determined in an agitated tank type of gas absorber. The variation of absorption coefficient with conversion into bicarbonate was studied in detail. The average absorption coefficient in the range of 0 to 90% conversion has been correlated with the speed of the agitator and indirectly with the power consumed by the agitator. D. M. Mason

Gas Mixture Laws

Flood, E. A. A NOTE ON THE VALIDITY OF THE GIBBS-DALTON LAW AS APPLIED TO DILUTE MIXTURES OF WATER VAPOR WITH HYDROGEN, HELIUM, AND ARGON AT ROOM TEMPERATURES. *Can. J. Chem.*, 31, 993-997 (1953) November.

Water vapor at room temperature and at pressures in the neighborhood of 10 mm. Hg behaves as a vacuum to each of the three gases hydrogen, helium, and argon, at pressures up to about 100 mm. Hg. The thermodynamic potentials of constituent gases in such mixtures of water vapor and hydrogen, water vapor and helium, etc. probably do not differ from those of the pure components, at equal volume concentrations, by more than 0.3%. Thus these gas mixtures obey the Gibbs-Dalton Law very closely and accordingly must also obey Dalton's Law. Velocity distribution functions of these gases under our experimental conditions are essentially Maxwellian. Author's Abstract

Ion Exchange

Hutcheon, J. M. ION EXCHANGE. *Chem. Process Eng.* (British), 34, 271-275 (1953) September.

A review of the new developments in the theory and applications of ion exchange methods is presented. D. V. Kniebes

Ore Treatment

ds Marchi, V. S. (assigned to Inland Steel Co.) METALLURGICAL PROCESS. U. S. 2,656,-267 (1953) October 20.

Beneficiation of low grade iron ore is realized by treatment with BF_3 at 600°F. so that the silica impurities may be transformed into a gaseous product, SiF_4, and separated from the

iron. The fluorides may be recovered by regenerating the exit gases with a molten mixture of NaF and B_2O_3. Furthermore other metals such as molybdenum, vanadium, tantalum and titanium which form volatile fluorides, may be separated in a similar manner from unreactive impurities. S. Mori

Petroleum Sulfur

Zijll, W. C. and Waterman, H. I. SULPHUR COMPOUNDS IN MINERAL OILS. *Chem. Eng. Sci.* (British), 2, 139-44 (1953) June.

A system of graphical representation of the ultimate analysis, specific refraction etc. of organic sulfur compounds is described and illustrated. The free energy of formation per C atom of thiols is presented graphically and discussed as an example of the information which can be correlated thereby. D. M. Mason

SO_2 Separation

Gray, K. R. and Crosby, H. L. (assigned to Rayonier Inc.) PROCESS FOR THE PREPARATION OF A SODIUM BISULFITE SOLUTION. U. S. 2,656,249 (1953) October 20.

Sodium salts of sulfurous acid free of undesirable contaminants such as sulfides, sulfur, thiosulfates, polythionates, etc. may be produced from sodium sulfide solutions by a process wherein the sodium of the sulfide solution is combined with an ion exchange resin, and the weakly acidic hydrogen sulfide is released in gaseous form. Controlled oxidation of the sulfur constituent to SO_2, free of undesirable byproducts, is then possible. Recombination of SO_2 with the sodium on the resin is readily effected to produce the sodium salts of sulfurous acid and regenerate the resin in form for reuse. D. M. Mason

9. ORGANIC CHEMISTRY

Butadiene

BUTADIENE FROM NORMAL BUTANE IN ONE STEP. *Oil Gas J.*, 52, 100, 103, 104 (1953) September 28.

A Houdry Process plant for the production of Butadiene from butane or butane-butene by dehydrogenation in one step is described. The feed is passed over a fixed bed of chrome-alumina catalyst at 1125°F., 5 in Hg abs, and at space velocities of 1 to 1.5 volumes feed per volume of catalyst per hour. Off-gas from the reactor contains about 11 per cent by weight of butadiene, but by utilizing recycle from the purification train the yield is about 56% of the fresh feed. The same process, by varying the operating conditions can also be used to give a substantial yield of butene or other monoolefins from their corresponding paraffin. J. M. Reid

Fulvenes

Day, J. H. THE FULVENES. *Chem. Rev.*, 53, 167-187 (1953) October.

This initial review of the fulvenes deals with the synthesis, reactions and physical properties of these interesting hydrocarbons. Fulvene, an isomer of benzene, was among the first colored hydrocarbons known, and affords an approach to the study of color, and to quantum mechanical treatment of structure. Prepared by condensing cyclopentadiene with a ketone or aromatic aldehyde, the simple substituted fulvenes show great reactivity and have great potential in the field of polymerization. Literature into 1953 is covered, with 82 references cited. O. P. Brysch

Isopropyl Reactions

Chilton, H. T. and Gowenlock, B. G. REACTION OF NITRIC OXIDE WITH GASEOUS HYDROCARBON FREE RADICALS. PART I. ISOPROPYL RADICAL. *J. Chem. Soc.* (British) 3232-36 (1953) October.

The reaction products of the pyrolysis of di-isopropylmercury in a slow system with nitrogen and nitric oxide as a carrier gas were found, by adsorption spectra and chemical tests, to be acetoxime and a nitroso compound, probably 2-nitrosopropane. G. V. Vosseller

Methylstyrenes

BENZENE IS BY-PASSED. *Chem. Week*, 73, 41-42 (1953) October 24.

The new American cyanamid process for methylstyrenes is briefly discussed. Starting with toluene or xylene and reacting with acetylene

or acetaldehyde forms ditolylethanes and dixylylethanes which are subsequently cracked to methyl- and dimethyl-styrenes. Together with the output from Dow's new plant using an alternate process, methystyrenes should have a definite effect on the styrene plastic industry.

J. M. Reid

Petrochemical Review

Bateman, R. L. and Field, J. A. 1952 PETROCHEMICALS VALUED AT $2.7 BILLION. *Oil Gas J.*, 52, 102, 103, 106, 108 (1953) October 26.

This paper is a qualitative review of petrochemical production. W. J. Pleticka

REIDEL, J. C. U. S. AND CANADIAN PETROCHEM PLANTS. *Oil Gas J.*, 52, 88-100 (1953) October 26.

A list of 255 operating petrochemical plants and their principle products includes ammonia, sulfur conversion and carbon-black plants.

G. V. Vosseller

Phenol Synthesis

Sherwood, P. W. SYNTHETIC PHENOL MANUFACTURE. PART II. THE REGENERATIVE (RASCHIG) PROCESS. *Petroleum Processing*, 8, 1543-1545 (1953) October.

Durez Plastics and Chemicals Co. at North Tonawanda, N. Y. are the only reputed users of the Raschig Process in the United States. This is a two-step operation where benzene is first catalytically chlorinated with HCl at 250°-270°C., and the monochlorobenzene so produced is then hydrolyzed with steam over tricalcium phosphate at 450°-500°C. The process has held its own since 1940 in competition with sulfonation, chlorination and cumene hydroperoxide methods. G. V. Vosseller

Xylene Demand

THE XYLENES STEP UP. *Chemical Week*, 73, 73, 74, 77, 78 (1953) October 17.

The article deals with past and future demands for xylenes. More separated xylenes will be available for promising polyester fiber, new film and plasticizer markets. W. J. Pleticka

10. CHEMICAL ENGINEERING

Adsorption Drying

Eagleton, L. C. and Bliss, H. DRYING OF AIR IN FIXED BEDS. *Chem. Eng. Progress*, 49, 543-548 (1953) October.

The rate of drying air in fixed beds of activated alumina, florite, and silica gel was studied. Effluent concentration as a function of time was measured at several values of inlet water concentration, bed length, flow rate, and temperature. It was found that the rate was governed by diffusion both through the air film and solid "film", and performance coefficients are given. These data are directly applicable to design problems, if the inlet water concentration is less than 0.003 lb. water per lb. air.

H. C. Owen

Condenser Design

Cairns, R. C. THE CONDENSATION OF VAPOR FROM GAS-VAPOR MIXTURES. *Chem. Eng. Science* (British), 2, 127-138 (1953) June.

Several generally accepted methods of heat exchanger (condenser) design were checked against experimental data obtained from a single vertical tube condenser operated on chloroform-air and steam-air systems. The method of Colburn and Hougen was found to give good agreement with the experimental work while the modification to this method suggested by Smith was found unnecessary and the approximate method by Colburn gave areas approximately 40% too large. J. M. Reid

Extractive Distillation

Cooper, H. B. and Medcalf, E. C. (assigned to American Cyanamid Co.) PROCESS FOR SEPARATING PREDOMINANTLY AROMATIC HYDROCARBONS FROM PREDOMINANTLY SATURATED HYDROCARBONS BY EXTRACTIVE DISTILLATION. U. S. 2,655,467 (1953) October 13.

Improvement is claimed in the extractive distillation process for separation of saturated hydrocarbons from aromatics commonly occurring in refinery light cycle gas oils by the use of phthalic anhydride as a solvent to suppress the vapor pressure of the aromatics. J. M. Reid

Fractionation

White, R. R. DISTILLATION OF QUATER-

NARY MIXTURES. COMPLETE COLUMNS —PARTIALLY DISTRIBUTED COMPONENTS. NO. 8. *Petroleum Processing*, 8, 1533-1536 (1953) October.

By specifying the composition of the least volatile component in both the distillate and bottom products, the separation of a given quarternary mixture of known relative volatilities has been worked out for various reflux conditions by stage-wise calculations in conjunction with quarternary diagrams. This is the 8th article in a series. S. Hu

Gas-Solids Contact

Friedman, A. H. (assigned to Phillips Petroleum Co.) DISTRIBUTION FOR INLET GAS. U. S. 2,654,659 (1953) October 6.

A means of avoiding undesired conditions within a fluidized reaction chamber by making uniform gas distribution possible and a high degree of contact between the gas and catalyst. An inert granular material 2-12 mesh resting in a conical lower section of the reactor serves as a distribution bed. H. A. Dirksen

Garbo, P. W. (assigned to Hydrocarbon Research Inc.) FLUIDIZED SOLIDS REACTOR. U. S. 2,655,437 (1953) October 13.

This reactor design incorporates a shell and tube heat exchanger vertically in the column containing the reaction zone to aid in heat distribution in fluidized solids beds. The reactant gases are introduced in the bottom of the bed which preferably is cone shaped. This method of introduction is supposed to assure uniform gas distribution over the entire bed area. Gas flow is up and solids flow is down in the space outside the tubes. Any suitable heat transfer medium can be used in the heat exchanger.
W. G. Bair

Heat Transfer

Deissler, R. G. ANALYSIS OF TURBULENT HEAT TRANSFER AND FLOW IN THE ENTRANCE REGIONS OF SMOOTH PASSAGES. Nat. Adv. Comm. Aero. Tech. Note 3016 (1953) October.

Values of heat-transfer coefficients in the entrance section of smooth pipes or flat plates are calculated. Approximately fully developed heat transfer was attained in an entrance length less than 10 diameters. Values of Nusselt numbers were obtained for heat transfer, where the length to diameter ratios were from 6 to 60. The theoretically calculated coefficients agreed very well with experimental references.
R. E. Peck

D.S.I.R. PROGRESS REVIEW NO. 26: HEAT TRANSFER. *J. Inst. Fuel* (British) 26, 178-188 (1953) October.

A literature survey of heat transfer published from 1948 to 1950 is presented. The authors limit their field to four branches which are conduction, convection (excluding high-speed flow and compressibility effects), radiation and heat exchangers. Conduction includes measurement of thermal conductivity, mathematical solutions of generalized problems and other solutions, such as graphical and electric-analog methods. Convection covers work such as flow through pipes, flow without confining boundaries, and many other geometric forms. Radiation treats such subjects as temperature measurement, furnaces, flames, transparent solids and space heating. New types of heat exchangers are abstracted and topics such as design, heat transfer, pressure drop and efficiency of exchangers are included. R. E. Peck

Ostrach, S. AN ANALYSIS OF LAMINAR FREE-CONVECTION FLOW AND HEAT TRANSFER ABOUT A FLAT PLATE PARALLEL TO THE DIRECTION OF THE GENERATING BODY FORCE. Nat. Adv. Comm. Aero. Report 1111 (1953)

The temperature- and velocity-distribution of a fluid around a vertical semi-infinite plate under steady-state condition due to free convection have been analyzed by means of the conventional method of mass, momentum, and energy balances. Fluid viscosity and thermal conductivity are assumed to vary exponentially with temperature and the ideal gas law is assumed for gaseous media. Boundary conditions are based on viscous flows. Transformation of the variables into dimensionless ratios and solu-

tion of the resulting equations by numerical integration with an IBM calculator yield results in good agreement with experimental observations, as shown by the several plots given.

S. Hu

Heat Exchangers

Rubin, F. L. FOR SPECIAL EXCHANGER DESIGNS. *Chem. Engrg.*, 60, 196-202 (1953) October.

Nine types of commercially available heat exchangers of special designs are briefly described and illustrated with sketches. Physical data are given in tabular form and current cost data presented graphically. S. Hu

Pipe Insulation

De Leij, P. J. HOW TO PICK THE RIGHT PIPE INSULATION. *Power*, 97, 78-81 (1953) November.

This article presents a calculation method and charts from which the best thickness and the most profitable insulation can be rapidly determined for insulating hot pipe.

S. Volchko

Process Costs

Gilmore, J. F., Jr. SHORT CUT ESTIMATING OF PROCESSES. *Petroleum Refiner*, 32, 97-101 (1953) October.

Process cost estimating is facilitated by applying a series of percentage factors to the cost of the total principal items as a means to approximate piping, insulation, structural costs, direct labor and other indirect costs. The cost of the total principal items, such as vessels, heat-exchangers, pumps, compressors, must be known, at least reasonably accurately, to apply this method of estimation. Illustrations are included for catalytic reforming, vacuum distillation and other refining processes.

C. G. von Fredersdorff

Pump Selection

Mann, M. HOW TO SPECIFY PUMPS. *Petroleum Refiner*, 32, 133, 134 (1953) October.

Complete and detailed specifications are essential for the selection of the optimum pump for every application. This is facilitated by use of the form illustrated in the article. A. J. Tulis

11. PROCESS EQUIPMENT AND INSTRUMENTATION

Computors

Keller, A. EXTENDING ENGINEERING SKILLS WITH LARGE-SCALE DIGITAL COMPUTERS. *Mech. Engrg.*, 75, 891-895 (1953) November.

A tremendous effort is going into the automatic calculator field and the latest developments have greatly extended the useful range of these machines. It now appears that computers can, in fact, "compute", and that a large number of new applications will appear in the near future. An outline is presented of the method by which a problem is reduced for solving by digital computers, and a list of questions to be answered, which should determine the economic advisability of having a large scale digital computer available for your company's engineers use.

B. E. Eakin

Flow Meter

Phillips, D. S. A ROBUST AIR-FLOW METER FOR FIELD USE. *J. Sci. Instruments* (British), 30, 382-88 (1953) October.

An air flow-meter which utilizes small orifices of varying diameters to control the pressure and the flow rate is described. A range of 0 to 25 cfm of flow can be obtained at 15 mm of Hg when the apparatus is installed in a vacuum pump system. S. Mori

Pressure Gage

Pilny, M. J. A SMALL PIRANI GAGE FOR MEASUREMENTS OF NONSTEADY LOW PRESSURES. Nat. Adv. Comm. Aero. Tech. Note 2946 (1953) June.

The construction and use of a small (0.0005 cu. in.) Pirani gage is described. It is useful for unsteady flow systems in the pressure range of 0.1 to 10 mm Hg absolute. Errors not exceeding 1 second, and calibration shifts of 2 percent per year were experienced with this gauge.

D. V. Kniebes

Pyrometry

Burton, E. J. RECENT ADVANCES IN RADIATION AND IMMERSION PYROMETRY. *Instruments*, **26**, 1524, 525, 550-552 (1953) October.

Recent advances in radiation and immersion pyrometry include 1) a reflecting-hemisphere radiation pyrometer for measuring surface temperatures of ingots, molds, and forgings in the range of 300 to 900 deg. C., 2) a tungsten-molybdenum thermocouple immersion pyrometer for measuring liquid-steel temperatures up to 1850°C., and 3) a fixed-focus narrow-angle mirror pyrometer for measuring total radiation from furnace flames. Author's Abstract

Heidmann, M. F. and Priem, R. J. APPLICATION OF AN ELECTRO-OPTICAL TWO-COLOR PYROMETER TO MEASUREMENT OF FLAME TEMPERATURE FOR LIQUID OXYGEN-HYDROCARBON PROPELLANT COMBINATION. Nat. Adv. Comm. Aero. Tech. Note 3033 (1953) October.

Temperature changes as high as 5000 cycles per second obtained in combustion of liquid oxygen-hydrocarbon propellant combinations is measured by the intensities of the emissivity of the flame at two wave lengths, 4800 and 6300 A° respectively. Calibration of the emissivity at these wave lengths with temperature is realized by using a tungsten bond ribbon whose emissivity and temperature are known. S. Mori

Recuperators

Trinks, W. FOREIGN METALLIC RECUPERATORS, TOWER TYPE. *Ind. Heating*, **20**, 1958, 60, 64, 66 (1953) October.

Several types of metallic recuperators are discussed, including the Austeel-Escher unit consisting of two concentric tubes where air is preheated in the annular space and hot flue gases pass through the center-tube which serves also as the stack. The Schack tower recuperator provides spiral vanes to produce helical air flow around the outside of a single central tube. Tubular type recuperators, consisting of a multiplicity of vertical pipes, are preferred in cases where flue gas-temperatures exceed 2000°F. C. G. von Fredersdorff

Regenerator Design

Knobloch, G. H. SIMPLE FORMULAS TO CALCULATE CHECKERBRICK REQUIREMENTS. *Gas Age*, **112**, 66-69 (1953) October 22.

Formulas are presented for calculating checkerbrick requirements for the design of heat storage equipment as used in oil cracking processes. Information which can be calculated include the number of bricks per course, total bricks, surface exposed to products and void between brick for equipment of circular, square or rectangular cross-sectional area. E. J. Pyrcioch

Peiser, A. M. and Lehner, J. DESIGN CHARTS FOR SYMMETRIC REGENERATORS. *Ind. Eng. Chem.*, **45**, 2166-70 (1953) October.

An approximate mathematical solution and derived design chart are presented for symmetric regenerators. The method of calculation permits the estimation of any two of the four principle variables in dimensionless units if two of these variables are known, i. e. dimensionless size, regenerator phase, mean temperature difference and dimensionless swing in exit-gas temperature. C. G. von Fredersdorff

Solids Control

Linford, A. INSTRUMENTATION IN COAL AND COKE HANDLING. *Coke and Gas* (British) **15**, 378-383 (1953) October.

Various types of British machinery and instruments used in measuring and controlling of coal and coke in bulk are described and illustrated. Also some developments in American instrument design are treated. S. Volchko

Valves

Morrell, J. N. REMOTE CONTROLLED MASTER VALVES ON OFFSHORE PLATFORMS. *Petroleum Eng.*, **25**, B-68, B70, B72 (1953) November.

A discussion of the safety feature of a remote controlled pneumatically operated master valve for offshore well-heads. W. G. Bair

12. MATERIALS OF CONSTRUCTION

Cathodic Protection

Ragland, T. M. PIPE-LINE INSULATION. *Oil Gas J.*, 52, 212, 15, 16, 18, 19 (1953) September 21.

Electrical segregation of various sections of pipelines by insulation permits effective and economic cathodic corrosion control. In this article the fundamentals of pipeline insulation are described and illustrated. A. J. Tulis

Corrosion

SYMPOSIUM ON CONTROL OF INTERNAL CORROSION OF TANKERS. Part I—Jupp, W. B. THE NATURE OF CORROSION AND ITS CONTROL. *Corrosion*, 9, 388-394 (1953) November: PART II—Malcolmson, J. V., Quimby, W. S., Pingrey, G. D. and Oosterhout, J. C. INHIBITORS IN CARGO. *Corrosion*, 9, 395-400 (1953) November: PART III—Kurz, A. B. CORROSION CONTROL IN PRACTICE. *Corrosion*, 9, 400-424 (1953) November.

Corrosion of the storage tanks in salt water oil tankers has long been a serious problem. This symposium gives probable causes, rates of corrosion and some suggestions for reduction in corrosion rate. W. G. Bair

Osterheld, C. M. (assigned to McGraw Electric Co.) CORROSION PREVENTING MEANS. U. S. 2,656,314 (1953) October 20.

An invention to provide a simple but efficient means for preventing corrosion of the inside surface of hot water tanks by means of a sacrificial anode from which without externally supplied voltage, a protective current will flow through the water to the tank. J. R. Boyd

Watkins, J. W. and Wright, J. CORROSIVE ACTION ON STEEL BY GASES DISSOLVED IN WATER. *Petroleum Engr.*, 25, B-50-57 (1953) November.

The results of a series 72 hrs. controlled dynamic laboratory test on the corrosive action of water solution of common gas are presented. All controllable factors were held constant.
E. J. Pyrcioch

Painting

Cook, R. H. HOW ROCHESTER PAINTED A 3-LIFT MMCF HOLDER BY THE FLOTATION METHOD. *Gas Age*, 112, 73, 118 (1953) October 22.

A new method is described of applying the final coat of paint to the lifts of a holder, by which a special paint floats on the sealing water and coats the descending lift-surface as it submerges through the paint into the water.
S. Volchko

Jones, L. G. HOW MUCH PAINT DO YOU NEED? *Power Engrg.*, 57, 68-70 (1953) November.

An example of the procedure in estimating the quantity and cost of paint, materials and labor required for painting the interior and exterior of a plant office building with the aid of the tabulated which is very useful for estimating various paint jobs. S. Volchko

Piping

Moerke, N. H. and Newman, C. CORRECTING AND PREVENTING COMPRESSOR PIPING VIBRATIONS. *Gas*, 29, 88-92, 94, 96 (1953) November.

The problem of vibration in general and especially as applied to the design of the piping at a compressor station having reciprocating compressors is discussed. The major causes of vibration in such piping are 1) the unbalanced mechanical forces set up by the reciprocating and rotating masses of the engine and compressor, and 2) gas stream pulsations induced by the compressor pistons and valve action. Adverse effects caused by these vibrations are discussed, as well as many suggested remedies. Two of the more important remedies are the use of adequately-sized engine foundations and the use of pulsation dampeners. The bibliography lists articles which develop details of various phases of the problem. H. C. Owen

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